Name: ______________________________

GCSE (1 – 9)

Recurring Decimals to Fractions

Instructions

- Use **black** ink or ball-point pen.
- Answer all questions.
- Answer the questions in the spaces provided
– there may be more space than you need.
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out.**

Information

- The marks for each question are shown in brackets
– use this as a guide as to how much time to spend on each question.

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end

1 Convert $\frac{2}{9}$ to a decimal.

$$9\overline{)2.0000} = 0.2222$$

$0.\dot{2}$

(Total for question 1 is 2 marks)

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2 Convert $\frac{4}{11}$ to a decimal.

$$11\overline{)4.00000} = 0.36363$$

$0.\dot{3}\dot{6}$

(Total for question 2 is 2 marks)

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3 Convert $\frac{5}{6}$ to a decimal.

$$6\overline{)5.00000} = 0.83333$$

$0.8\dot{3}$

(Total for question 3 is 2 marks)

4 Prove algebraically that the recurring decimal $0.\dot{8}$ can be written as $\frac{8}{9}$

① $0.\dot{8} = x$

② $8.\dot{8} = 10x$

② − ① $8 = 9x$

$x = 8/9$

(Total for question 4 is 2 marks)

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5 Prove algebraically that the recurring decimal $0.4\dot{7}$ can be written as $\frac{43}{90}$

$0.4\dot{7} = x$

① $4.\dot{7} = 10x$

② $47.\dot{7} = 100x$

② − ① $43 = 90x$

$x = \frac{43}{90}$

(Total for question 5 is 2 marks)

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6 Prove algebraically that the recurring decimal $0.2\dot{3}$ can be written as $\frac{7}{30}$

$0.2\dot{3} = x$

① $2.\dot{3} = 10x$

② $23.\dot{3} = 100x$

② − ① $21 = 90x$

$x = \frac{21}{90} = \frac{7}{30}$

(Total for question 6 is 2 marks)

7 Write $0.1\dot{6}$ as a fraction in its simplest form.

$0.1\dot{6} = x$

$1.\dot{6} = 10x$

$16.\dot{6} = 100x$

$15 = 90x$

$x = \frac{15}{90} = \frac{1}{6}$

$\frac{1}{6}$

(Total for question 7 is 2 marks)

8 Write $0.2\dot{7}$ as a fraction in its simplest form.

$0.2\dot{7} = x$

$2.\dot{7} = 10x$

$27.\dot{7} = 100x$

$25 = 90x$

$x = \frac{25}{90} = \frac{5}{18}$

$\frac{5}{18}$

(Total for question 8 is 2 marks)

9 Write $0.4\dot{3}$ as a fraction in its simplest form.

$0.4\dot{3} = x$

$4.\dot{3} = 10x$

$43.\dot{3} = 100x$

$39 = 90x$

$x = \frac{39}{90} = \frac{13}{30}$

$\frac{13}{30}$

(Total for question 9 is 2 marks)

10 Prove algebraically that the recurring decimal $0.6\dot{8}\dot{1}$ can be written as $\frac{15}{22}$

$0.6\dot{8}\dot{1} = x$

$6.\dot{8}\dot{1} = 10x$

$681.\dot{8}\dot{1} = 1000x$

$675 = 990x$

$x = \frac{675}{990} = \frac{15}{22}$

(Total for question 10 is 2 marks)

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11 Prove algebraically that the recurring decimal $0.\dot{2}1\dot{6}$ can be written as $\frac{8}{37}$

$0.\dot{2}1\dot{6} = x$

$216.\dot{2}1\dot{6} = 1000x$

$216 = 999x$

$x = \frac{216}{999} = \frac{8}{37}$

(Total for question 11 is 2 marks)

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12 Prove algebraically that the recurring decimal $0.\dot{1}2\dot{6}$ can be written as $\frac{14}{111}$

$0.\dot{1}2\dot{6} = x$

$126.\dot{1}2\dot{6} = 1000x$

$126 = 999x$

$x = \frac{126}{999} = \frac{14}{111}$

(Total for question 12 is 2 marks)

13 Write $3.2\dot{5}\dot{4}$ as a fraction in its simplest form.

$$3.2\dot{5}\dot{4} = x$$
$$32.\dot{5}\dot{4} = 10x$$
$$3254.\dot{5}\dot{4} = 1000x$$
$$3222 = 990x$$
$$x = \frac{3222}{990}$$
$$= \frac{179}{55} \text{ OR } 3\frac{14}{55}$$

$\frac{179}{55}$ ....

(Total for question 13 is 3 marks)

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14 Write $2.7\dot{4}\dot{2}$ as a fraction in its simplest form.

$$2.7\dot{4}\dot{2} = x$$
$$27.\dot{4}\dot{2} = 10x$$
$$2742.\dot{4}\dot{2} = 1000x$$
$$2715 = 990x$$
$$x = \frac{2715}{990}$$
$$= \frac{181}{66} \text{ OR } 2\frac{49}{66}$$

$\frac{181}{66}$ ....

(Total for question 14 is 3 marks)

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15 Write $3.\dot{5}9\dot{4}$ as a fraction in its simplest form.

$$3.\dot{5}9\dot{4} = x$$
$$3594.\dot{5}9\dot{4} = 1000x$$
$$3591 = 999x$$
$$x = \frac{3591}{999}$$
$$= \frac{133}{37} \text{ OR } 3\frac{22}{37}$$

$\frac{133}{37}$ ....

(Total for question 15 is 3 marks)

16 x is an integer such that $1 \le x \le 9$

Prove that $0.\dot{0}\dot{x} = \frac{x}{99}$

① $0.\dot{0}\dot{x} = y$

② $x.\dot{0}\dot{x} = 100y$

② − ① $x = 99y$

$y = \frac{x}{99}$

....

(Total for question 16 is 2 marks)

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17 Work out: $0.\dot{5}\dot{4} \times 0.\dot{5}$

$0.\dot{5}\dot{4} = x$

$54.\dot{5}\dot{4} = 100x$

$54 = 99x$

$x = \frac{54}{99} = \frac{6}{11}$

$0.\dot{5} = y$

$5.\dot{5} = 10y$

$5 = 9y$

$y = \frac{5}{9}$

$\frac{6}{11} \times \frac{5}{9} = \frac{30}{99}$

$= \frac{10}{33}$

$\frac{10}{33}$
....

(Total for question 17 is 4 marks)

18 Work out: $0.\dot{3}\dot{9} \div 0.\dot{6}\dot{3}$

$0.\dot{3}\dot{9} = x$

$39.\dot{3}\dot{9} = 100x$

$39 = 99x$

$x = \frac{39}{99}$

$= \frac{13}{33}$

$0.\dot{6}\dot{3} = y$

$63.\dot{6}\dot{3} = 100y$

$63 = 99y$

$y = \frac{63}{99}$

$= \frac{7}{11}$

$\frac{13}{33} \div \frac{7}{11}$

$\frac{13}{\not{33}_3} \times \frac{\not{11}^1}{7} = \frac{13}{21}$

$\frac{13}{21}$ ....

(Total for question 18 is 4 marks)

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19 Work out: $0.0\dot{7} \div 0.\dot{1}8\dot{5}$

$0.0\dot{7} = x$

$0.\dot{7} = 10x$

$7.\dot{7} = 100x$

$7 = 90x$

$x = \frac{7}{90}$

$0.\dot{1}8\dot{5} = y$

$185.\dot{1}8\dot{5} = 1000y$

$185 = 999y$

$y = \frac{185}{999}$

$= \frac{5}{27}$

$\frac{7}{90} \div \frac{5}{27}$

$\frac{7}{\not{90}_{10}} \times \frac{\not{27}^3}{5} = \frac{21}{50}$

$\frac{21}{50}$ ....

(Total for question 19 is 4 marks)